

### **REMARKS**

Applicants thank the Examiner for the thorough examination given the present application.

#### **Status of the Claims**

Claims 1, 4-22, and 24-29 will be pending in the above-identified application upon entry of the present amendment. Claims 13-16 and claims 18-21 are currently withdrawn from consideration. As such, claims 1, 4-12, 17, 22, and 24-29 stand ready for further action on the merits. Claim 1 has been amended by incorporating the subject matter of claims 2-3. As such, claims 2-3 have been cancelled herein. Claim 23 has also been cancelled herein. Claim 16 has been amended herein to delete the Japanese characters. Claims 25-29 have been added. Support for new claim 25 can be found in the present specification, *inter alia*, at page 14. Support for new claim 26 can be found in the present specification, *inter alia*, at page 21. Support for new claims 27-29 can be found in the present specification, *inter alia*, at page 33. Thus, no new matter has been added. Based upon the above considerations, entry of the present amendment is respectfully requested.

In view of the following remarks, Applicants respectfully request that the Examiner withdraw all rejections and allow the currently pending claims.

#### **Issues under 35 U.S.C. § 112, second paragraph**

The Examiner has rejected claims 23 under 35 U.S.C. § 112, second paragraph, as being indefinite. Claim 23 has been cancelled herein, which renders this rejection moot. As such, Applicants respectfully request that the rejection be removed.

#### **Issues under 35 U.S.C. § 103(a)**

1) Claims 1-10, 12, 17, and 22-24 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent Application Publication No. 2002/0125818 to Sato et al. (hereinafter, "Sato '818").

2) Claim 11 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Sato '818 in view of U.S. Patent No. 6,962,755 to Ise et al. (hereinafter, "Ise '755").

Applicants respectfully traverse, and reconsideration and withdrawal of these rejections are respectfully requested.

*Legal Standard for Determining Prima Facie Obviousness*

MPEP 2141 sets forth the guidelines in determining obviousness. First, the Examiner has to take into account the factual inquiries set forth in *Graham v. John Deere*, 383 U.S. 1, 17, 148 USPQ 459, 467 (1966), which has provided the controlling framework for an obviousness analysis. The four *Graham* factors are:

- (a) determining the scope and content of the prior art;
- (b) ascertaining the differences between the prior art and the claims in issue;
- (c) resolving the level of ordinary skill in the pertinent art; and
- (d) evaluating any evidence of secondary considerations.

*Graham v. John Deere*, 383 U.S. 1, 17, 148 USPQ 459, 467 (1966).

Second, the Examiner has to provide some rationale for determining obviousness. MPEP 2143 sets forth some rationales that were established in the recent decision of *KSR International Co. v. Teleflex Inc.*, 82 USPQ2d 1385 (U.S. 2007). Exemplary rationales that may support a conclusion of obviousness include:

- (a) combining prior art elements according to known methods to yield predictable results;
- (b) simple substitution of one known element for another to obtain predictable results;
- (c) use of known technique to improve similar devices (methods, or products) in the same way;
- (d) applying a known technique to a known device (method, or product) ready for improvement to yield predictable results;
- (e) “obvious to try” – choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success
- (f) known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations are predictable to one of ordinary skill in the art;

(g) some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention.

As the MPEP directs, all claim limitations must be considered in view of the cited prior art in order to establish a *prima facie* case of obviousness. See MPEP 2143.03.

Distinctions over the Cited References

As pointed out by the Examiner, Sato '818 discloses that a plurality of host materials may be used together. However, as the Examiner recognizes, Sato '818 does not disclose specific examples or working examples where two or more kinds of host materials are actually used together. In addition, Sato '818 does not provide any disclosure as to what combination is to be adopted for using the materials together. Furthermore, Sato '818 does not disclose an embodiment where two kinds of host materials are a combination of a hole-transporting material with an electron-transporting material.

In stark contrast, amended claim 1 recites, *inter alia*, that “the hole injection/transport compound has an ionization potential of from 5.6 eV to 6.1 eV and the electron injection/transport compound has an electron affinity of from 2.0 eV to 3.5 eV.” Thus, in the present invention, each of the hole injection/transport compound and the electron injection/transport compound corresponds to a specific physical property. In addition, “the luminescent layer contains at least one electron injection/transport compound [and] at least one hole injection/transport compound.” These elements are necessary for achieving the excellent and unexpected effects of improvement in external quantum efficiency and operation durability.

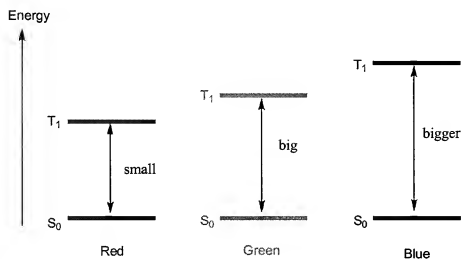
In this regard, claim 1 recites a luminescent layer that contains an electron injection/transport compound, a hole injection/transport compound, and a green or blue phosphorescent material and satisfies the following formulae at the same time:

Electron injection/transport compound  $T_1 \geq$  Phosphorescent material  $T_1$

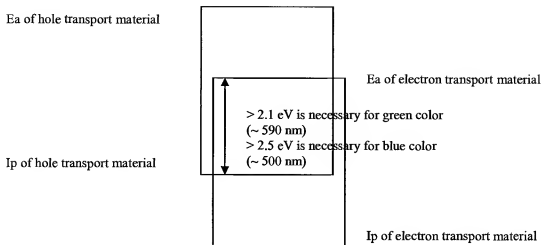
Hole injection/transport compound  $T_1 \geq$  Phosphorescent material  $T_1$

Using a red phosphorescent material as an example, there are very many electron injection/transport compounds and hole injection/transport compounds that satisfy the condition of the above formulae, and it is easy to select materials that meet the characteristic of each phosphorescent material.

However, in the case of green and blue phosphorescent materials, their energy gap is much wider than the energy gap of red phosphorescent materials since luminescence of far higher energy is needed for green and blue luminescence. Therefore, it is difficult to combine a hole injection/transport compound having a hole injection property (appropriately small  $I_p$  value) suitable for the phosphorescent luminescent material used with an electron injection/transport compound having an electron injection property (appropriately large  $E_a$  value) suitable for the phosphorescent luminescent material used where the condition of the above-mentioned formulae is satisfied. (When a blue phosphorescent compound is used, the situation is particularly difficult.)



In addition to the above difficulty, when the luminescent layer contains both the electron injection/transport compound and the hole injection/transport compound as in the present invention, it is necessary in relation to energy balance that the difference between  $I_p$  of the hole injection/transport compound and  $E_a$  of the electron injection/transport compound is not less than 2.1 eV (about 590 nm in terms of wavelength) in the case of a green phosphorescent material and is not less than 2.5 eV (about 500 nm in terms of wavelength) in the case of a blue phosphorescent material (refer to the following drawing). On the other hand, in the case of Sato '818 where only one kind of a host material is used, it is acceptable for the gap between  $E_a$  and  $I_p$  of the used host material *per se* to be not less than 2.1 eV (green) or not less than 2.5 eV (blue) whereby there is no difficulty in investigating the "suitable combination," which is necessary when using two or more hosts.



As mentioned above, in the present application, the luminous color of the phosphorescent luminescent material is limited to green and blue, and further, a hole injection/transport compound having a specific Ea value is combined with an electron injection/transport compound having a specific Ip value whereupon excellent efficiency and durability are achieved. Therefore, it is very difficult even for one of ordinary skill in the art and is not obvious to predict the effect of the present application from Sato '818 in which many host materials are listed and there is a mere one-passage-description that a plurality of host materials may be used.

Enclosed herewith is a 37 CFR § 1.132 Declaration of Toshihiro Ise, one of the present inventors. The Examiner is respectfully requested to review the enclosed Declaration of Dr. Ise as it provides strong evidence of the patentability of the present invention.

In the enclosed Declaration, additional test data are set forth, which show that the specific conditions of the present invention are not easy to obtain based on the disclosure of Sato '818. In fact, excessive trial-and-error is necessary for achieving the unexpectedly superior effects of the present invention when relying on the disclosure of Sato '818. When comparing external quantum efficiency and operation durability, the present invention is unexpectedly superior. The enclosed Declaration also includes further inventive examples (Additional Examples 3-26). Additional Comparative Examples 1-108 strongly evidence that the cited references do not produce the results of the present invention.

As shown in the enclosed Declaration, not all of the combinations of host materials disclosed in Sato '818 provide the desired effect, and many of the combinations do not even emit light.

In stark contrast, the present invention claims a specific combination of the materials providing extremely high performance. Undue efforts would be required to find the specific combination of the present invention from the disclosure of Sato '818, and the contents of the present invention are not obvious.

Based on the remarks above, Applicants therefore respectfully submit that the claims of the present application clearly distinguish over Sato '818. Applicants further submit that Ise '755 does not overcome the deficiencies of Sato '818.

#### **New Claims 25-29**

Applicants have newly added claims 25-29 in an effort to further define the scope of protection owed to Applicants. Applicants respectfully submit that claims 25-29 are allowable for the reasons given above. As such, Applicants respectfully assert that claims 25-29 clearly define over the cited references, and an early action to this effect is earnestly solicited.

#### **CONCLUSION**

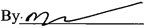
As the above amendments and remarks address and overcome the rejections, withdrawal thereof and allowance of the claims are respectfully requested.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Chad M. Rink, Reg. No. 58,258, at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

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Respectfully submitted,

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Attachment: Executed Declaration under 1.132